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Claims

1. A method of detecting, characterising or monitoring a hydrocarbon zone, which method comprises the genotypic analysis of a sample for the presence of one or more thermophilic or extremophilic microorganisms.
2. A method as claimed in claim 1 wherein the sample is from the sub-surface formation.
3. A method as claimed in claim 1 or claim 2 wherein the sample is oil, water or a oil/water mixture from an exploration or production well.
4. A method as claimed in any preceding claim wherein the hydrocarbon is oil or water that has been exposed to oil.
5. A method as claimed in any preceding claim wherein information regarding the microorganisms present is utilised in an ongoing exploration or production process.
6. A method as claimed in any preceding claim wherein a plurality of different microorganisms are detected thereby generating a microbiological profile for said sample.
7. A method as claimed in claim 6 wherein the generated microbiological profile is compared against one or more reference profiles.
8. A method as claimed in any preceding claim wherein the sample is analysed for the presence of *Archaeoglobus*, *Erythrobacter*, *Arcobacter*, *Geothermobacter*, *Thermodesulforamonas* and *Thermotogales*.

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9. A method as claimed in any preceding claim which does not comprise a culturing step.

5 10. A method as claimed in any preceding claim wherein the sample is contacted with one or more different oligonucleotides designed to hybridise to regions of nucleic acid from or derived from the thermophilic or extremophilic microorganisms.

10 11. A method as claimed in any preceding claim wherein at least some of the nucleic acid within the sample is amplified.

15 12. A method as claimed in any preceding claim wherein the hydrocarbon zone is characterised such that information about the type of oil, the quantity of oil, the quality of the oil, the sulphur content of the oil, the presence of gas or the gas:oil ratio is obtained.

20 13. A method of determining the depth of a hydrocarbon zone, which method comprises the genotypic analysis of a sample for the presence of one or more thermophilic or extremophilic microorganisms, wherein the particular microorganisms identified are indicative of a certain  
25 depth.

14. A method as claimed in claim 13 wherein the hydrocarbon zone is an oil reservoir.

30 15. A method as claimed in any preceding claim wherein genotypic analysis is performed using one or more probes from the group represented by SEQ ID No. 1 to SEQ ID No. 19.

35 16. An oligonucleotide as defined in any one of SEQ ID No. 5 to SEQ ID No. 19 or a functionally equivalent variant thereof.

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17. A solid support having attached thereto one or more oligonucleotides as defined in claim 16.

5 18. A solid support as claimed in claim 17 which is a microchip.

19. A solid support as claimed in claim 17 or 18 which has at least 4 oligonucleotides as defined in claim 16 attached thereto.

10 20. A kit for use in a method as claimed in any one of claims 1 to 15 comprising one or more oligonucleotides as defined in claim 16.